

CLAIMS

What is claimed is:

1. A radio frequency (RF) upconverter with carrier feedthrough cancellation comprising:
 - an upconverter core having a first input terminal for receiving a first signal having predetermined spectral content at an input frequency and an output terminal for providing an output signal having substantially said predetermined spectral content at a higher frequency using a local oscillator signal having a carrier frequency;
 - an electrical measurement circuit having an input terminal coupled to said output terminal of said upconverter core, and a first output terminal for providing a first offset correction signal representative of a power of said output signal at said carrier frequency; and
 - a first summing device having a positive input terminal for receiving a first input signal, a negative input terminal coupled to said first output terminal of said electrical measurement circuit, and an output terminal coupled to said first input terminal of said upconverter core for providing said first signal.
2. The RF upconverter of claim 1 wherein said electrical measurement circuit comprises:
 - a first mixer having a first input terminal for receiving said output signal, a second input terminal for receiving said local oscillator signal, and an output terminal; and
 - a first integrator having an input terminal coupled to said output terminal of said first mixer, and an output terminal for providing said first offset correction signal.

UTILITY PATENT APPLICATION
ATTORNEY DOCKET NO. SILAPW0007 (025.0007)

3. The RF upconverter of claim 2 wherein said electrical measurement circuit further comprises:
 - a storage element having an input terminal coupled to said output terminal of said integrator, and an output terminal; and
 - a switch having a first terminal for providing said first output terminal of said electrical measurement circuit, and a second terminal alternately coupled to said output terminal of said first integrator during a calibrate period and to said output terminal of said storage element during an operate period.
4. The RF upconverter of claim 1 wherein said upconverter core further has a second input terminal for receiving a second signal characterized as being in quadrature with said first signal and further provides said output signal by converting said second signal to said higher frequency using a quadrature local oscillator signal having said carrier frequency.
5. The RF upconverter of claim 4 wherein said upconverter core comprises:
 - a first mixer having a first input terminal for receiving said first signal, a second input terminal for receiving said local oscillator signal, and an output terminal;
 - a second mixer having a first input terminal for receiving said second signal, a second input terminal for receiving said quadrature local oscillator signal, and an output terminal;
 - a phase shifter having an input terminal for receiving said local oscillator signal, and an output terminal coupled to said second input terminal of said second mixer for providing said quadrature local oscillator signal; and
 - a summing device having a first positive input terminal coupled to said output terminal of said first mixer, a second positive input terminal coupled to said output terminal of said second mixer, and an output terminal for providing said output signal.

UTILITY PATENT APPLICATION
ATTORNEY DOCKET NO. SILAPW0007 (025.0007)

6. The RF upconverter of claim 4 wherein said electrical measurement circuit further has a second output terminal for providing a second offset correction signal representative of a power of said output signal at said carrier frequency and in quadrature with said first offset correction signal, and the RF upconverter further comprises a second summing device having a positive input terminal for receiving a second input signal, a negative input terminal coupled to said second output terminal of said electrical measurement circuit, and an output terminal coupled to said second input terminal of said upconverter core for providing said second signal.
7. The RF upconverter of claim 6 wherein said electrical measurement circuit further comprises:
 - a second mixer having a first input terminal for receiving said output signal, a second input terminal for receiving said quadrature local oscillator signal, and an output terminal; and
 - a second integrator having an input terminal coupled to said output terminal of said second mixer, and an output terminal for providing said second offset correction signal.
8. The RF upconverter of claim 7 wherein said electrical measurement circuit further comprises:
 - a second storage element having an input terminal coupled to said output terminal of said second integrator, and an output terminal; and
 - a second switch having a first terminal for providing said second output terminal of said electrical measurement circuit, and a second terminal alternately coupled to said output terminal of said second integrator during a calibrate period and to said output terminal of said second storage element during an operate period.

9. A method for carrier feedthrough cancellation in a radio frequency (RF) upconverter comprising:
 - converting a first signal having predetermined spectral content from an input frequency to a higher frequency using a local oscillator signal having a carrier frequency and providing an output signal having substantially said predetermined spectral content in response thereto;
 - electrically measuring a power of said output signal at said carrier frequency and providing a first offset correction signal in response thereto; and
 - subtracting said first offset correction signal from a first input signal to provide said first signal.
10. The method of claim 9 wherein electrically measuring said power comprises:
 - mixing said output signal with said local oscillator signal to provide a mixed signal; and
 - integrating said mixed signal to provide said first offset correction signal.
11. The method of claim 9 wherein converting said first signal from said input frequency to said higher frequency comprises converting said first signal from an intermediate frequency (IF) to RF.
12. The method of claim 9 wherein converting said first signal from said input frequency to said higher frequency comprises converting said first signal from baseband to RF.

UTILITY PATENT APPLICATION
ATTORNEY DOCKET NO. SILAPW0007 (025.0007)

13. The method of claim 12 wherein converting said first signal comprises:
 - converting said first signal from said input frequency to said higher frequency using said local oscillator signal to provide a first intermediate signal;
 - converting a second signal characterized as being in quadrature with said first signal from said input frequency to said higher frequency using a quadrature local oscillator signal having said carrier frequency to provide a second intermediate signal; and
 - summing said first and second intermediate signals to provide said output signal.

14. The method of claim 13 further comprising:
 - electrically measuring a power of said output signal at said carrier frequency using said quadrature local oscillator signal to provide a second offset correction signal; and
 - subtracting said second offset correction signal from a second input signal to provide said second signal.

15. A method for carrier feedthrough suppression in a radio frequency (RF) upconverter comprising:

converting first and second signals having predetermined spectral content from an input frequency to a higher frequency respectively using a local oscillator signal and a quadrature local oscillator signal each having a carrier frequency to provide an output signal having substantially said predetermined spectral content;

electrically measuring a power of said output signal using said local oscillator signal to provide a first offset correction signal; and

subtracting said first offset correction signal from an in-phase input signal to provide said first signal;

electrically measuring said power of said output signal using said quadrature local oscillator signal to provide a second offset correction signal; and

subtracting said second offset correction signal from a quadrature input signal to provide said second signal.

16. The method of claim 15 wherein converting said first and second signals comprises:

mixing said first signal with said local oscillator signal to provide a first intermediate signal;

mixing said second signal with said quadrature local oscillator signal to provide a second intermediate signal; and

summing said first and second intermediate signals to provide said output signal.

17. The method of claim 15 wherein electrically measuring said power of said output signal using said local oscillator signal comprises:

mixing said output signal with said local oscillator signal to provide a first mixed signal; and

integrating said first mixed signal to provide said first offset correction signal.

UTILITY PATENT APPLICATION
ATTORNEY DOCKET NO. SILAPW0007 (025.0007)

18. The method of claim 17 wherein electrically measuring said power of said output signal using said quadrature local oscillator signal comprises:
 - mixing said output signal with said quadrature local oscillator signal to provide a second mixed signal; and
 - integrating said second mixed signal to provide said second offset correction signal.
19. The method of claim 15 further comprising:
 - storing said first offset correction signal in a first storage element during a calibrate period; and
 - using an output of said first storage element as said first offset correction signal during an operate period.
20. The method of claim 19 further comprising:
 - storing said second offset correction signal in a second storage element during said calibrate period; and
 - using an output of said second storage element as said second offset correction signal during said operate period.